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CIRCULAR NO. 1 Division of Soils

United States Department of Agriculture,

WEATHER BUREAU,

DIVISION OF AGRICULTURAL SOILS.

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ANNOUNCEMENT.

A new Division has been created in the Weather Bureau of the U. S. Department of Agriculture, to be known as the Division of Agricultural Soils. This Division has been added to those assigned by the Secretary to the Assistant Secretary in the order of January 2, 1894, and is subject to all the rules therein set forth.

It will be the duty of this Division to supplement the present work of the Weather Bureau by continuing the study of the rainfall and temperature after they enter the soil, and to keep a continuous record of the moisture and temperature conditions within some of the most important types of soil in the country. Rain is of little benefit to plants until it enters the soil where it can be absorbed by their roots. It is extremely important, therefore, to continue the study of the rainfall further than has heretofore been done, and to keep a record of the amount and distribution of the moisture and temperature within the soils adapted to different agricultural crops. In the humid portions of the United States rain falls, on an average, for two or three consecutive days, and is followed by an interval of eight or ten days of fair weather. The soil has to offer such a resistance to the descent of this rainfall that a sufficient quantity of water may be retained for the use of crops during the fair-weather period. It should not, however, offer too much resistance, as this would interfere with a free circulation of air within the soil. The actual conditions of air, moisture, and temperature which soils are able to maintain largely determine what classes of plants are adapted to the soils. The relative amount of moisture maintained by different soils for the use of plants, and the relative temperature of soils, depend very largely upon their texture, so that, even with the same rainfall and exposure to heat, different soils may maintain very different conditions. This difference in the meteorological conditions under the surface has an important bearing upon the adaptability of soils to crops, because of the influences on their development, yield, texture, quality, vitality, and time of ripening.

It shall be the duty of this Division to establish the meteorological conditions maintained by important types of soils, like the early truck lands; by the soils adapted to the several grades of tobacco and to the different varieties of cotton and fruit; by wheat and corn lands; and by the soils of the arid and semi-arid regions, where the duty of water is so all important.

The simple record of moisture in the soil from time to time will be of great interest and have a wide practical application to agriculture. It is difficult to tell from the rainfall table whether the season has been favorable or otherwise for the crops, for so much depends upon the distribution of the rainfall and upon how it fell that it is impossible to judge how much has been available to plants. A record of the soil moisture, however, will show directly how much of the water has been available. When the conditions favorable to different agricultural interests are once established and when the conditions maintained by different types of soils are known, a basis will be provided for the classification and valuation of other lands for different classes of crops and for the more intelligent improvement of lands.

The meteorological conditions within the soil which are unfavorable to certain kinds of plants may be extremely favorable to others, and may thus offer advantages for special agricultural interests which can not be carried on in other soils. For this reason the early truck crops of the Atlantic seaboard are confined to a very narrow strip of soils of peculiar texture, which a few years ago were lying out as barren wastes, not being adapted to the then staple crops, wheat and corn. They are now the most valuable lands of the Eastern States when devoted to early truck. The same may be said of the bright tobacco lands of the South, which were so poor that they were generally left out as barren wastes, until it was discovered that they were adapted to this particular interest. They give a texture and color to the tobacco which can not be produced on other soils. The texture of the lands and the meteorological conditions they maintain force the truck crops to a quick and early development, and give a fine texture and bright yellow color to the tobacco when it is properly cultivated and cured.

This adaptation of certain soils and localities to special crops and agricultural interests may be seen in all parts of the country, and is very largely due to the ordinary atmospheric meteorological conditions, and to the relation of the different soils to these conditions. This relation of the soils to the rainfall and heat has as a rule far more effect upon the crops than the difference in the chemical composition of the soils, for all soils have a large excess of plant food over and above the requirements for even very large crops.

When the meteorological conditions within the soil are unfavorable to the proper development of plants not only may the yield and quality of the plants be affected, but they may be rendered more liable to dis-

31106

eases and insect ravages. It is a very common experience of farmers that plants are more liable to diseases in some seasons than in others and on certain soils than on others. Cotton growing on low, wet land, or in a wet season, or during a season or on a soil in which there are sudden changes of wet and dry, is very liable to diseases and insect ravages. The same is true of tobacco to a very marked extent, and is more or less true of all crops.

It is coming to be believed now, furthermore, that the deterioration of lands is not due directly to the loss of plant food by crops so much as to a change in the physical condition or structure of the soil, and a change in the conditions of moisture and temperature which the soil can maintain. Under the influence of the artificial conditions of cultivation, manuring, and cropping the texture of the soil changes. It may become closer and more retentive of moisture and supply too much moisture and too little air to the roots of plants, or it may become too open and porous and not be sufficiently retentive of moisture for the best development of plants.

The texture of soils and their relation to moisture and heat can be very greatly changed by different methods of cropping, cultivation, and manuring, so that the actual conditions of moisture and temperature within the soils at the disposal of crops are largely under our control if we know how to intelligently use these forces.

Stations will be located in the most important established soil types, where records will be kept of the soil moisture and temperature by the regular or volunteer observers of the Weather Bureau, or when these are not properly located for this work, by others who may be interested in the work. It is hoped that the experiment stations, the agricultural colleges, the State weather services, and other institutions and individuals interested in this line of work will cooperate as the investigations develop.

It is particularly requested that all publications relating to the general subject of meteorology in its relation to agricultural soils be sent to this Division, as well as any publications bearing upon the geological origin of soils, or upon their physical structure, condition, chemical composition, and agricultural value.

MILTON WHITNEY,
Chief of Division.

Approved:
J. STERLING MORTON,
Secretary.

WASHINGTON, D. C., *March 30, 1894.*

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